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Take, shape and create • Lesson 1 •

**Lesson 1**

**Launch**

**Year 2**

How can we change familiar objects?

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-1-how-can-we-change-familiar-objects](https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-1-how-can-we-change-familiar-objects?utm_source=docx&utm_medium=lesson_1&utm_campaign=TSC) |

# Lesson overview

Students are introduced to the core concept and context—creating 3D sculptures by physically changing materials.

## Learning Goals

Students will:

* demonstrate curiosity and ask questions about familiar objects and how they might be changed.
* identify ways that materials can be physically changed.

Students will represent their understanding as they:

* contribute to discussions and a class mind-map/retrieval chart on ways to physically change materials.

## Assessment advice

In the Launch phase, assessment is diagnostic.

Take note of:

* What understanding do students have of the term ‘materials’? Have they used it in its everyday sense meaning textiles? Have they begun to use it in a scientific sense?
* What understanding have students shown of physical changes? Have they named actions that can lead to physical change? Have they been able to enact these?

## List of materials

Whole class:

* Class science journal (digital or hard-copy)
* A4 piece of paper
* Large selection of everyday items made of different materials such as plastic, fabric/fibres, metal, wood, etc. See [Preparing for this sequence](https://primaryconnections.org.au/teaching-sequences/year-2/materials-building-sculptures) for further guidance in selecting these items.
* If you elect to do the Building towers activity in this lesson, you will need a subset of everyday items for students to use to build towers.
  + These materials should need to be physically changed to help them stay upright/together, e.g. through bending, folding, twisting etc. Providing ‘block’ type items that can be stacked might make a tall tower, but it does not allow students to explore how materials might be changed.
  + You might provide one specific material only, such as paper and related products, or you might provide a different category of materials to different teams.
* A gallery of images of different sculptures made from recycled/reused materials (see Example sculpture gallery resource available for download)
* Optional: Labelled buckets/containers to collect and store resources used during the unit that are made of different materials, for example wood, plastic, fabric/fibres, metal etc. At the end of each investigation, students return the items they have used to its container. This reinforces the ideas that, although the items might have been physically changed, materially it is still the same.

Each group:

* A4 piece/s of paper (if allowing students to test their ideas for making a paper loop)
* A variety of familiar objects with which to build a tower (if undertaking this activity)

Each student:

* Individual science journal (digital or hard-copy)

### Safety note

Special care should be taken with any items made of glass or metal. Whilst students might be able to examine and discuss these objects, supervised if required, they should be discouraged from physically changing them. Physically changing glass or metal can produce shards and sharp cutting edges that pose a danger to students.

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Experience and empathise | 15 minutes | Whole class, collaborative teams |
| Elicit | 15 minutes | Collaborative teams, whole class |
| Anchor | 15 minutes | Whole class |
| Connect | 15 minutes | Whole class |

# Launch

## Experience and empathise • Paper loops and building towers

The following tasks are two options for how you might support students to have a shared experience to begin this teaching sequence. **Paper loops** relates to the content of the unit (how materials can be changed) and **Building towers** relates to the context of the unit (how we might build a 3D sculpture or model using materials that have been physically changed).

Select the task that best suits the needs and context of your students and classroom. You may choose to do both if time permits.

### Paper loops

Students work in collaborative teams on the following challenge: How might we change an A4 piece of paper in a way that would allow us to easily step through it?

Allow students time to brainstorm, and if appropriate, test their ideas.

Share students’ ideas as a class.

Demonstrate how a piece of A4 paper can be cut to form a loop large enough for students to step through carefully:

A paper with text on it

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Discuss how the paper has changed, and also how it has not changed.

**Potential discussion prompts**

* *What has changed?*
  + The shape of the paper.
* *How was it changed?*
  + It was cut with scissors.
* *What else might you use besides scissors?*
* *Do you think you could do the same thing with larger piece of paper? A smaller piece?*
* *What has not changed about the paper?*
  + Colour, weight, what it’s made of.
* *What do we know about paper? What is it made of? How it can be changed?*
  + It can be torn, cut, folded, rolled, bent, twisted, scrunched etc.
* *What is it used for?*

**Optional:** Allow students the opportunity to make their own paper loops.

**Building towers**

Provide students in collaborative teams with an assortment of everyday items and issue the challenge: *Build the tallest tower possible with your objects.* Ask them to take note of what they do to each object to make it stay in place.

Allow teams time to build their towers, then view each team’s tower before discussing what students did.

**Potential discussion prompts**

* *What objects have you used to build your tower?*
* *What materials are these objects made of?*
  + It is important to distinguish between the name of the object and the material it is made out of.
  + In some cases the object and material might be the same (a piece of paper is made of paper), but students might also answer that they have made their tower out of yogurt containers, for example, which are made of plastic.
* *How have you made your tower stay together? Did you fold things, twist them, squash or squish them?*

## Elicit • Examining objects

Provide a large selection of everyday items for students to examine. Individually or with a partner, students examine and discuss an object, sharing their prior knowledge about it and discussing ways it could be physically changed. Model a sample discussion for students.

* *What is it?*
* *What is it made of?*
* *What is it used for?*
* *Is there a similar item to it made of something different e.g. plastic and metal spoons?*
* *What could you do to this item to change its size, shape, thickness, length, etc.?*

Some examples of physically changing objects that you might wish to draw out through discussion are: bending, twisting, folding, scrunching, stretching, cutting, tearing, chopping, breaking, heating, cooling, sanding/filing.

Allow students time to examine and discuss their objects.

Share students’ ideas and collect the information in a table in the class science journal. For example:

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Further discuss the objects.

* *What couldn’t you do to change this object?*
  + For example, you couldn’t rip a piece of metal.
* *What change might make this object a safety hazard?*
  + You could crush a glass bottle, but doing that would make it sharp, and you could cut yourself.
* *What actions do we make when we twist, bend, fold, scrunch etc. a material? How are these actions similar and different?*
  + Encourage students to use physical actions to show how they twist, fold, or scrunch something.
* *Can we use a different amount of strength/ level of force when we make these actions? How do you think that will affect what happens?*

## Anchor • Sculpture gallery

Explain that now students have seen and discussed how familiar objects and materials can be changed, they will examine ways in which artists have used and changed everyday, familiar objects to create sculptures/models.

Display an image gallery of sculptures made with clearly identifiable recycled and reused objects/materials.

Discuss: What is a sculpture? Why do people make them? Think about any sculptures in the school environment and what their purpose is.

Discuss and define the term ‘object’ and ‘material’, noting the difference between everyday use of ‘material’ and its scientific use. Note that objects are made up of a single material or a combination of different materials.

Discuss the objects/materials used in the sculptures you have displayed, and how the materials have been physically changed to create each sculpture.

**Note:** Both the terms ‘object’ and ‘material’ have been used here. That is because students might refer to either when describing the sculptures. If they name an object, probe further to see if they can also name the material/s that object is made of.

**Potential discussion prompts**

* *What objects/materials can you see?*
* *What materials have the objects been made from?*
* *What do you think they objects were originally used for used for? What do they all have in common?*
* *Why do you think the objects have been made out of these materials?*
* *How have these objects/materials been changed?*
* *What techniques have been used to change them?*
* *How have they stayed the same?*
* *What might we have to think about when we design and create our own sculptures?*

## Connect • How can we use our learning?

Introduce and link the context and content of the teaching sequence: students will be learning about the effects of using different methods to change a material’s size, shape, thickness, texture. They will then apply these ideas to make a 3D sculpture/model that utilises the materials we see and use everyday in a new way. If you have selected a specific theme for the sculpture that will govern its design (see [Preparing for this sequence](https://primaryconnections.org.au/teaching-sequences/year-2/materials-building-sculptures)), introduce this theme here also.

You might like to share sculptures during a class or school event, such as an ‘art show’. Inform students of the selected mode of showing their sculptures/models.

Support students to generate any questions they have about materials and how they might be physically changed, what affect these changes might have on the material, and what that might mean for the sculpture they design.

Record student questions to refer back to during the course of the unit.

**Reflect on the lesson**

You might:

* group together similar questions and ask students which ones they think would be important to answer first.
* begin a class word wall related to materials and how they can be changed.

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**Year 2**

Take, shape and create • Lesson 2 • What changes?

**lesson 2**

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# Lesson overview

Students explore the effects of different physical actions (changes) on different materials to determine if the materials are flexible.

## Key learning goals

Students will:

* predict if specific materials can be changed in different ways, e.g. can wood be twisted, torn, bent, scrunched, stretched and poked?
* observe what happens to everyday materials when they are physically changed in different ways.
* describe materials as flexible and inflexible.

Students will represent their understanding as they:

* record results of their investigation in a table.
* draw a labelled diagram to represent what is happening to a material when it is physically changed.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* Are students able to explain and reason about what is unchanged about a material, even though its shape, size etc. has been changed?
* Are students able to identify where their predictions did and did not match their evidence?
* Are students connecting their observations (evidence) to their explanations?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* A variety of familiar objects made of common materials (see [Preparing for this sequence](https://primaryconnections.org.au/teaching-sequences/year-2/materials-building-sculptures))
* Demonstration copy of **What changes? Resource sheet**

**Each group**

* Familiar object/s (made from plastic, fabric/fibres, metal, wood, etc.) to examine

**Each student**

* Individual science journal (digital or hard-copy)
* **What changes? Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 10 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 20 minutes | Collaborative teams, Whole class |
| Integrate | 20 minutes | Whole class |

# Inquire

## Re-orient

Recall the previous lesson, focusing on the objects that students examined and ways they suggested the objects could be changed. Refer to the ideas map or retrieval charts created.

Review the meanings of the terms 'object' and 'material' in a scientific sense.

Explain that from now on we are going to describe objects in terms of the materials they are made of, and sometimes we might need adjectives to help with our descriptions. View some of the objects available to students and name the materials they are made out of. Select two objects made of the same material and use adjectives to differentiate between the two, such as thick and thin plastic.

**Note:** At this stage it is acceptable for students to use everyday language such as ‘thick’ and ‘thin’ to describe the differences between materials. The following series of investigations will explore properties and introduce more scientific terminology in context.

## Question • What happens when I bend it?

Refer back to any questions about how objects/materials might be physically changed. For example: How do we physically change an object? How do we scrunch, twist or bend things? What happens when we physically change (material)?

**Pose the question:** *What happens to (material) when I bend it? Twist it? Fold it?*

## Investigate • Changing materials

Working in collaborative teams, students select one of the provided materials.

**Discuss:**

* *What is meant by the terms ‘scrunched’, ‘twisted’, ‘torn’, ‘bent’, ‘stretched’ and ‘poked’?*
* *How do we create these changes with our hands/bodies?*
* *What might happen to the material when it is ‘scrunched’, ‘twisted’, ‘torn’, ‘bent’, ‘stretched’ and ‘poked’?*
* *Does it break?*
* Introduce the terms ‘flexible’ and ‘inflexible’: flexible objects do not break or tear. Inflexible objects will not bend or twist or will break/tear when bent.
* Is the material being changed?
  + When a physical change occurs, a material changes its state, appearance, or shape but remains the same material.

Demonstrate how to complete the PROE chart on the **What changes? resource sheet.**Students record their prediction (P) of how their material changes and their reasons (R) for these predictions in the first two columns of the PROE chart. Students might not necessarily agree on their predictions when working in a team, and this is perfectly acceptable. You might ask students to create their own PROE charts. This allows students to express different ideas if necessary, and support assessment of individual students.

Students complete the O and E sections of the PROE chart by:

* physically changing their selected material in the listed ways, recording the results and why they think that happened.
* describing the material as flexible or inflexible.
* representing their understanding by drawing a labelled diagram of the material being physically changed.

Students can repeat the activity with multiple materials if appropriate.

## Integrate • What have we learned?

Share and discuss results as a class. Select or emphasise comments that recognise that the shape of the material may have changed, but that the material itself was unchanged.

**Potential discussion prompts**

* *What material did you change?*
* *How would you describe the material?*
* *What object was made out of that material?*
* *What might the object be used for?*
* *Who might use the object?*
* *Was the material able to be changed in each of the listed ways?*
* *What was it like before the change?*
* *What was it like after the change?*
* *What stayed the same?*
* *Do you think the change is permanent?*
* *How did the change affect the material?*
* *Can the material still be used for its original purpose? How? Why? Why not?*
* *Can it be re-used? Recycled? Repurposed?*

**Discuss:**

* *What flexible materials do you use every day?*
  + The clothes they wear, paper they write on etc.
* *What would happen if the material was not flexible?*
* *When might we need materials to not be flexible?*
  + For example, the walls of a house.
* *What would happen if walls were flexible?*
* *How might some of the materials examined today be used in a sculpture?*
  + For example, flexible materials might be good for covering the sculpture, but they might not be as good to hold other heavier materials up.

**Reflect on the lesson**

You might:

* add to the class word wall of vocabulary related to materials and physical changes including flexible and inflexible.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* discuss how students were thinking and working like scientists during the lesson. Focus on the predictions they made and how accurate these predictions were. Discuss how they were able to make accurate predictions, and why some predictions might have been harder to make.

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**Year 2**

**lesson 3**

**INQUIRE**

Take, shape and create • Lesson 3 • Elastic plastic

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# Lesson overview

Students explore the effects of different physical actions on different types of plastic, to determine if plastic is both flexible and elastic.

## Key learning goals

Students will:

* predict and examine the effects of physical changes on plastic.
* determine if all types of plastic can be changed in the same way.
* describe plastics as flexible and inflexible, and elastic and inelastic.

Students will represent their understanding as they:

* record predictions and findings on a data table.
* contribute to a class discussion about the properties of plastic and how physical changes can affect these properties.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* the claims students are making about the flexibility and elasticity of each type of plastic. Are they referring to the definitions and their evidence to make their claims?
* how they plan to/describe using plastics when designing and building their sculpture.
* Have they recognised that not all changes are permanent and that some plastics will be elastic, partially elastic, or inelastic?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Demonstration copy of **Playing with plastic Resource sheet**

**Each group**

Plastic items to examine and test, including:

* thin flexible and elastic plastics (cling wrap, sandwich bags/wrappers)
* flexible and inelastic plastics (drink and takeaway containers)
* inelastic and inflexible plastics (carry tubs and baskets)

**Each student**

* Individual science journal (digital or hard-copy)
* **Playing with plastic Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 15 minutes | Collaborative teams, Whole class |
| Investigate | 20 minutes | Collaborative teams |
| Integrate | 20 minutes | Collaborative teams, Whole class |

# Inquire

## Re-orient

Recall the previous lesson and discuss any objects students examined that were made of plastic. Discuss what students know about plastic and how it is used.

## Question • Sorting plastic

Refer to any questions students asked about plastic in the Launch phase. For example: What is made of plastic? Are there different types of plastic? How can plastic be changed?

Distribute a variety of items made of different types of plastic.

Students sort the plastic items into groups, describing what each group has in common. The items may be sorted multiple times in various ways, for example what they are used for, whether they can be recycled easily, and the type of plastic they are made from.

Review the terms flexible (able to bend without breaking/tearing) and inflexible (not able to be bent, or will tear/break when bent or twisted). Determine if students have already created categories for these, and if not, how they would sort the objects to fit into the categories ‘flexible’ and ‘inflexible’.

Introduce the terms elastic (returns easily to its original form after being bent, stretched or compressed) and inelastic (doesn’t return to original form after being bent, stretched or compressed).

**Pose the question:** *If a plastic is flexible, does it mean it is elastic too?*

## Investigate • Investigating plastic

Students select items made from different types of plastic.

They determine the best action to test their elasticity. For example a sandwich bag might be scrunched, but a plastic lid might need to be bent.

Using the PROE chart on the Playing with plastic Resource sheet, they:

* predict if the material in the object is flexible: it can be bent, twisted, or scrunched.
* predict if the material in their object is elastic: it will return to its original shape.
* observe what happens when they bend, twist, or scrunch the material.
* explain why they think that happened.

Allow time for students to carry out their investigation.

## Integrate • Discussing plastic

Share and discuss the results of students’ investigations:

**Potential discussion prompts**

* *What happened to each item you tested?*
* *Which ones could be changed and which ones couldn’t?*
* *Why do you think that happened?*
* *What would you say about each object’s flexibility and elasticity?*
* *Were all flexible objects also elastic?*
* *Were any of the objects that were inflexible also elastic?*
  + Students should find that inflexible objects are also inelastic.
* *If something can’t be bent out of shape, does it need to go back to its original shape?*
* *What was similar about the flexible and elastic items? The inflexible and inelastic items?*
* *Are there ‘levels’ of elasticity? Do things ‘kind of’ return to their original shape, but not fully? Do some things need ‘help’ to return to their original shape?*
  + For example, cling wrap.
* *Can elasticity change over time?*
* *What other actions might physically change the plastic items?*
* *Will they still be made of plastic?*
* *Will all actions work on all kinds of plastic? i.e. Can you tear all kinds of plastic?*
* *How easy was it to physically change the soft plastic? How about the harder plastics?*
* *Why do you think that?*
* *What actions might physically change the hard, inflexible plastic that we can’t test in the classroom?*
* *Does physically changing the plastic change what the item can be used for? For example, if I stretch out the handle of a plastic bag, will it still carry as much shopping?*

Discuss how flexible/inflexible and elastic/inelastic plastics might be used in student sculptures, and what they will have to consider when they use them.

**Potential discussion prompts**

* *Which type of plastic will be easiest to change and use in your sculpture?*
* *If you want to use plastics that are elastic in your sculpture, what do you have to consider?*
  + They will need to be fastened in the preferred shape, otherwise they will return to their original shape.
* *How might you stop them returning to their original shape?*
* *What about inflexible, inelastic plastic? Are they going to be as easy to change? How might you use that type of plastic?*

Optional: Look at the [recyclability of different types of plastic](https://theconversation.com/curious-kids-why-can-some-plastics-be-recycled-but-others-cant-229270). Discuss ways in which elastic plastic can be reused many times, when it is difficult to recycle, and alternatives for using plastic packaging and why this is so important.

**Reflect on the lesson**

You might:

* add to the class word wall of vocabulary related to elastic and inelastic.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* discuss the safety of undertaking investigations, and why some tests can be undertaken in the classroom but others cannot. For example, we might be able to use a plastic fork to poke a hole in soft plastics like cling wrap, but we would need something sharper to make a hole in hard plastic. However, testing this in the classroom wouldn’t be safe.

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**Year 2**

Take, shape and create • Lesson 4 • What could wood do?

**lesson 4**

**inquire**

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# Lesson overview

Students explore the effects of bending wood in order to determine if or when wood is flexible.

## Key learning goals

Students will:

* identify ways wood can be physically changed.
* predict the effects of specific changes on wood.
* compare their predictions to results.

Students will represent their understanding as they:

* contribute to the creation of an accurate data table within which to record data.
* contribute to class discussions to reach consensus.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* the claims students make about how wood can be changed, and which changes are possible in a classroom environment.
* Are students able to determine what thicknesses of wood might be suitable to use when designing and building their sculpture, and which would not be suitable?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Optional: Demonstration copy of **Changing wood Resource sheet**

**Each group**

3 different pieces of wood to test how wood can be changed:

* 1 x thin, flexible wood such as a thin stick or skewer
* 1 x medium thick wood such as a thicker stick or pop-stick
* 1 x thick piece of wood such as a branch or ruler
* Pair of standard classroom scissors
* Sandpaper

**Each student**

* Individual science journal (digital or hard-copy)
* Optional: **Changing wood Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 20 minutes | Collaborative teams, Whole class |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Recall the previous lesson focusing on the effect that bending, twisting and tearing had on the plastic items.

Review the meaning of the terms ‘flexibility’ (ability to bend without breaking) and ‘elasticity’ (ability to return to original shape).

## Question • What can we do with wood?

Discuss wood and its uses.

**Potential question prompts**

* *Where does wood come from?*
* *How are wood and plastic the same and different?*
  + During the discussion make sure to touch on wood being a natural material and plastic being man-made.
* *Do we sometimes use wood and plastic for the same purpose?*
* *How is/has wood been used, both now and in the past?*
  + Consider referring back to the sculpture gallery shown in the Launch phase and focusing on any objects made of or containing wood.
* *What are some ways we can change wood?*
  + Scratch it, burn it, paint it, cut it etc.

Refer back to any questions about wood in the students asked in the Launch phase.

**Pose the question**: *What happens when we bend, twist, sand, or change wood in other ways?*

## Investigate • Investigating changes to wood

After selecting three different pieces of wood of varying thickness, students undertake an investigation to answer the question: How can we change wood?

Examine the samples of wood and discuss student predictions about how each piece of wood might be changed, if they can be changed easily, and if they can all be changed in the same way.

List student suggestions on how wood might be physically changed. If students haven’t suggested it, examine the sandpaper and discuss what it is and how it can be used.

Use the Changing wood Resource sheet or create your own sample data table for students to record result.

For example:

A table with text on it

Description automatically generated

In collaborative teams students test different ways wood can be changed, including by cutting with scissors and by sanding.

## Integrate • Does wood bend or twist?

Share and discuss results as a class. Focus on how easy it is to change the wood and if the thickness of the wood had an impact on the changes that could be made.

**Potential discussion prompts**

* *Did the wood you tested bend or break?*
* *Was there a difference between how easy it was to change the thicker wood and the thinner wood? Why do you think that is?*
* *What differences do sanding and cutting make to wood? In what ways are these kinds of changes used in real-life? Why are they used?*
* What do you think about the ‘dust’ that is created when you sanded the wood? Is it still wood?
  + This is called ‘sawdust’ or ‘wood dust'. It is very small chips of wood.
* *How flexible do you think wood is?*
* *Can you think of any examples where flexible wood is used in real life?*
  + Bird nests, some woven baskets.
* *How do people change the size and shape of thick pieces of wood so they can use them? Can we test these types of changes in the classroom? Why/Why not?*
* *How would you describe wood and different thicknesses of wood?*
* *How might wood be used in a sculpture? What types of wood will you be able to use easily, and how might you change it?*
* *How might you change the colour of wood?*
* *If we change the wood’s size, shape, colour etc., is it still wood?*

**Reflect on the lesson**

You might:

* add to the class word wall vocabulary related to wood and how it can be changed.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* consider how our knowledge of the way wood can be changed and used has grown and developed over time. Consider how First Nations Australians used wood for tools, shelter, clothing, and what types of woods they would have used for each purpose. Consider uses of wood in modern shelter building, and the different ways it is changed to make it suitable for use.

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**Year 2**

Take, shape and create • Lesson 5 • What can paper do?

**lesson 5**

**inquire**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-5-what-can-paper-do](https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-5-what-can-paper-do?utm_source=docx&utm_medium=lesson_5&utm_campaign=TSC) |

# Lesson overview

Students explore the effects of folding paper, and how being folded might change its strength.

## Key learning goals

Students will:

* identify factors that make a test ‘fair’.
* make predictions about how much weight a piece of paper will hold based on its shape.
* analyse results, and make changes to ensuing investigations based on these results.
* determine ways paper can be changed so it will hold more weight.

Students will represent their understanding as they:

* use oral, written and visual language to record and analyse investigation results.
* record data in a table.
* discuss findings to reach consensus about how to change paper to increase the amount of weight it can hold.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* how students change the shape of the paper to potentially hold more weight.
  + Are they able to make the link between the shape of the corrugated cardboard and how they might change the shape of the paper, or did they require prompting?
* how students adhere to fair-testing principles.
  + Did they maintain fair-testing principles (as closely as feasible for a classroom environment), thus demonstrating an understanding of their importance?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Samples of different types of paper for students to examine (drawing paper, tissue paper, crepe paper, paper towel, etc.), including an A4 sheet of paper
* Samples of cardboard for students to examine, including an A4 or similar piece of corrugated cardboard
* A number of small objects to act as weights, such as paper clips, pencils, MAB cubes etc.
* Demonstration copy of **Powerful paper Resource Sheet**
* 2 stacks of items, for example books, that are the same height

**Each group**

* A4 paper
* 2 stacks of items, for example books, tissue boxes or MAB flats, that are the same height. Each team does not need to have the same items, as long as the items in each stack are the same and the stacks are the same height within the group.
* A number of small objects to act as weights, such as paper clips, pencils, MAB cubes etc.
* Scissors

**Each student**

* Individual Science journal
* **Powerful paper Resource Sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 20 minutes | Collaborative teams, Whole class |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

If you did the **Paper loop** activity in Lesson 1, discuss how the paper was changed to create the paper loop (by cutting) and what about the paper was changed (its shape and size).

If this activity was not completed, refer to other instances in the sequence where students have examined and potentially changed paper.

## Question • Examining paper

Refer to any questions about paper asked by students and recorded at the end of the Launch phase.

Provide students with different types of paper and cardboard to examine and discuss with a partner.

**Prompts to focus the discussion include:**

* What is each type of paper used for?
* How would you describe each type of paper?
  + Its thickness, strength, shape etc.
* What do you notice about the structure/shape of the cardboard? What does its inside layer look like?
  + Don't introduce the term corrugated at this time. It will be introduced later in the lesson. You might simply refer to the sample as a piece of a cardboard box.
* How can each sample be physically changed?

Record ideas, and any further questions students have about paper and cardboard, in the class science journal.

**Pose the question:** *Can changing the shape of paper affect how much weight it can hold?*

## Investigate • Testing paper strength

A close-up of several books

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Suspend an A4 sheet of paper between two stacks of the same height, for example books.

**Discuss with students:** *Will the paper hold any weight? If so, how much? Why do you think that?*

Test out students’ ideas by adding weights from the classroom (e.g. a pencil, paper clips, MAB cubes) onto the unsupported section of paper between the books, until the paper can no longer support the weight. You might repeat this as many times as required using lighter/heavier objects.

**Potential discussion prompts**

* *What if we test with cardboard? Would we have a different result?*
* *Can I add a different item every time I add weight? Why or why not?*
* *Would this test be fair if I did that?*
* *How will I know how many of an item it will hold if I keep changing the item?*

**Ask students:** *How could we change the shape of the paper to see if it would hold more weight?* Record students' ideas on the demonstration copy of the **Powerful paper Resource sheet.**

Discuss fair testing principles, noting that for a test to be fair, one thing is measured, one thing is changed, and everything else stays the same.

**Optional:** To highlight why these principles are important, repeat the demonstration adding weight to the suspended piece of paper, but change multiple variables. For example, each time weight is added add another layer of paper, or move the side supports closer together, or add a different amount of weight (in the form of a different item). Discuss how, because two things were changed each time, it’s impossible to know which of them had an impact on the amount of weight the paper could hold.

In this investigation students will:

* **change** the shape of the paper.
* **measure** how much weight it will hold, by counting the number of items the paper holds. Ensure one item is added at a time, and that all items are the same, for example adding pencils, paperclips, or MAB cubes one at a time.
* leave everything else the **same**.

Brainstorm with students what must stay the same, e.g. the distance between the side supports, the height of the desk, the items being added.

Revise the testing procedure as required: students suspend their paper between two stacks of the same height and add weight one item at a time, until the paper can no longer support the weight. They change the shape of the paper in some way and repeat, to determine if this shape of paper can hold more, or less, weight.

Allow students time to brainstorm, test, and record the results of their ideas in collaborative teams. Students use the Powerful paper Resource sheet (or create your own) to record results.

A black line drawing of a chat box

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**Note:** Folding the paper into an accordion shape mimics the inner, corrugated layer of a cardboard box. This shape will support the most weight. If students need a prompt to consider this shape remind them of the piece of cardboard box they examined at the beginning of the lesson, and the shape of the inside layer.

## Integrate • Which shape is the strongest?

Share the results of the investigation with the class. Select or emphasise comments that focus on how changing the shape of the material (but not what it is made of) can affect how it can be used.

**Potential discussion prompts**

* *What changes to the shape of the paper did you make?*
* *Why did you try these different shapes?*
* *Did one idea lead you to trying something else? Can you explain why?*
* *What shape did you find held the most weight?*
* *Why do you think that shape worked best?*
* *What words would you use to describe the paper at the beginning? As it changed?*
  + Flexible, thin, thicker, thick, strong, stronger etc.
* *Did the flexibility of the paper change when you made the paper stronger?*
* *How could you change the shape of materials in your sculpture to make them stronger?*

Introduce the term corrugated (having parallel rows of folds that look like a series of waves when seen from the side) as the technical term to describe the shape that held the most weight.

**Optional:**You might decide to investigate if different sized corrugations might support more weight, or if layering pieces of corrugated paper might do the same.

**Reflect on the lesson**

You might:

* add to the class word wall of vocabulary related to paper and how it can be changed.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* discuss how common the use of paper and cardboard packaging is, and how people have been able to change paper in many ways to suit their needs.

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**Year 2**

Take, shape and create • Lesson 6 • What happens to playdough when it isleft exposed to air?

**lesson 6**

**inquire**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-6-what-happens-playdough-when-it-left-exposed-air](https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-6-what-happens-playdough-when-it-left-exposed-air?utm_source=docx&utm_medium=lesson_6&utm_campaign=TSC) |

# Lesson overview

Students explore how the properties of playdough change as it dries out.

## Key learning goals

Students will:

* participate in planning and conducting a fair-test investigation.
* make predictions about how easy it will be to change the shape of playdough (its malleability).
* make claims supported by evidence collected during their investigation.

Students will represent their understanding as they:

* record their fair-test investigation using an investigation planner.
* record observation in a data table.
* contribute to class discussions.

## Assessment advice

In this lesson, assessment is summative.

Students working at the achievement standard (science inquiry) should have:

* made predictions based on their experiences.
* followed investigation procedures and made and recorded observations.
* recorded data using tables and other graphic organisers.
* compared their observations with others, recognising similarities and differences.

Refer to the Australian Curriculum content links on the [Our design decisions tab](https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-6-what-happens-playdough-when-it-left-exposed-air?utm_source=docx&utm_medium=lesson_6&utm_campaign=TSC) for further information.

## Resources

**Whole class**

* Class science journal (digital or hard-copy)
* Demonstration copy of **Easy or hard? Resource sheet**

**Each group**

* 9 x small balls of playdough (3 balls fresh from container, 3 balls left in air for 3 hours or days, 3 balls left in air for 3 days or weeks).

See [*Preparing for this sequence*](https://primaryconnections.org.au/teaching-sequences/year-2/materials-building-sculptures) for a recipe for making your own playdough.

**Per student**

* Individual science journal (digital or hard-copy)
* Easy or hard? Resource sheet

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 20 minutes | Whole class, Collaborative teams |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Recall the previous lesson, focusing on how changing the shape of something can affect its strength.

## Question • Examining playdough

Show students playdough in a sealed container.

Elicit their questions and ideas about the properties of the playdough through discussion. Record any questions/ideas in the class science journal.

**Potential discussion prompts**

* *What do you think the playdough will be like when we take it out of the container?*
* *How could we change the playdough?*
* *What would happen to the playdough if we left it out of the container for an hour, a day, or a week?*
* *What questions might you ask about the playdough?*

Introduce the word ‘malleable’: how easy a material is to reshape.

**Pose the question:** *How malleable is playdough when it’s left out of its container?*

## Investigate • Testing playdough

Students will test how easy it is to change playdough that has:

* come straight from the container,
* been out of the container for a few hours or days, and
* been out of the container for a few days or weeks.

They will test three different actions/changes (for example scrunching, stretching and bending) on the different types of playdough.

**Discuss:**

* how students might rate the malleability of the playdough (how easy it is to make it into different shapes), for example easy, hard, impossible
* the level of strength/force that might be required to determine each rating.

**Plan the investigation:**

* **Change**the length of time the playdough has been out of the container
* **Measure** how easy it is to change the playdough
* And leave everything else the **Same.**
  + Brainstorm with students what must stay the same, for example the type of playdough, the amount of playdough, the shape of playdough.

Discuss why it is important to change how long the playdough is out of its container but keep everything else the same.

**Potential discussion prompts**

* *Would it be fair if we use different sized balls of playdough? Why or why not?*
* *Would it be fair if we use different brands of playdough? Why or why not?*

Allow students time to brainstorm, test, and record the results of their ideas in collaborative teams.

Use the **Easy or hard? Resource sheet** (or create your own) to record results.

## Integrate • Which shape is the strongest?

Share the results of the investigation with the class.

**Potential discussion prompts**

* *What actions did you use to change the ball of playdough?*
* *Which ball of playdough was the easiest to change? The hardest? Why do you think that?*
* *What do you think happened to the playdough the longer it was left out of the container?*

Present the following three statements (or claims) to the students:

* Claim 1: The longer the playdough is left out of its container the easier it is to change its shape (more malleable).
* Claim 2: The longer the playdough is left out of its container the harder it is to change its shape (less malleable).
* Claim 3: Playdough gets cracks in it when it is left out of its container (not malleable).

**Discuss:**

* which claim/s they agree with and why, referring back to the evidence of their investigation to support their thinking.
* what other materials might be similar to playdough, or behave in a similar way. For example bread dough, clay, or even glue.
* how they might use what they have learnt when making their 3D sculptures.

**Reflect on the lesson**

* add to the class word wall of vocabulary related to malleable.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* consider how scientists use evidence to make claims.

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**Year 2**

Take, shape and create • Lesson 7 • Changing materials to build a sculpture

**lesson 7**

**ACT**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-7-changing-materials-build-sculpture](https://primaryconnections.org.au/teaching-sequences/year-2/take-shape-and-create/lesson-7-changing-materials-build-sculpture?utm_source=docx&utm_medium=lesson_7&utm_campaign=TSC) |

# Lesson overview

Students consolidate their learning by designing and making a sculpture that uses everyday materials that have been physically changed.

## Key learning goals

Students will:

* be guided through the design thinking process to select and change materials to build a 3D sculpture/model.
* Students will represent their understanding as they:
* create an annotated diagram to explain the materials used in their design and how they were changed.
* communicate their design choices to a selected audience.

## Assessment advice

In this lesson, assessment is summative.

Students working at the achievement standard should have:

* demonstrated an understanding that materials can be changed, and how they might be changed, and that, despite being changed they remain the same material.
* Evidence might include materials identified in their sculpture design, appropriateness of the changes made to it, appropriateness of the materials selected for a specific change, and in identifying the base material of each component of their sculpture.
* applied their learning when selecting materials to design and build their sculpture.
* Evidence should be found in students’ sculptures/models.

Refer to the Australian Curriculum content links on the [Our design decisions tab](https://primaryconnections.org.au/teaching-sequences/year-2/materials-building-sculptures) for further information.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)

A gallery of images of different sculptures made from recycled/reused materials, as used in the Launch phase

**Each student**

* Individual science journal (digital or hard-copy)

Various everyday materials to design and build a 3D sculpture/model, including materials that have been examined and investigated throughout the sequence, and classroom art and craft supplies

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Anchor | 10 minutes | Whole class |
| Connect | 5 minutes | Whole class |
| Design | Variable | Whole class, Individual |
| Communicate | Variable | Whole class |

# Act

## Re-orient

Re-examine the data and ideas collected in the class science journal over the course of the teaching sequence.

## Anchor • What have we learned?

Discuss what conclusions students have drawn about materials and how their size, shape, colour etc. can be physically changed, whilst the material itself remains the same.

**Potential discussion prompts**

* *What materials are malleable/elastic/flexible/strong.*
* *What kinds of materials can be easily physically changed?*
* *What kinds of materials are harder to change?*
* *Can all materials be changed in the same ways?*
* *What does it mean when we ‘physically change’ a material?*
* *How is the material made different?*
* *How does it stay the same?*
* *What materials might be readily available for our sculptures?*
* *What environmental considerations should we make?*

## Anchor • What have we learned?

Refer to the image gallery of sculptures from the Launch phase. Discuss again the materials used and how those materials were changed. Challenge students to think more deeply about what they are observing in the sculptures.

## Design • Designing and building a sculpture

Using the steps of the design thinking process, students use their understanding of materials and how they can be physically changed to design a 3D sculpture or model. You might present students with a design brief to outline what you would like them to do. Consider if you will add some parameters around the design (for example, it needs to contain materials that have been bent, folded and stretched). Consider if the sculpture created should adhere to a specific theme related to your school or community context.

### Define

Outline the problem in a simple manner such as:

How can we … (use and physically change everyday materials) ... to ... (design a sculpture/model)…for…(a sculpture walk/garden/display)?

### Ideate

Brainstorm ideas related to the design of the sculpture. At this stage, to support creative thinking, every idea offered by students should be recorded in the class science journal. No idea is discounted, as the practicality/possibility of each idea will be considered later.

As students offer ideas, ask probing questions (Why do you think … or How do you know that…) to draw out the reasoning and evidence behind the idea.

**Potential discussion prompts**

* *What materials could we use?*
* *What materials could represent other things?*
  + For example, scrunched and cut blue paper to represent the sea and waves, or twisted plastic to represent sea foam.
* *How might they be changed?*
* *How could we join the materials together?*

Once all ideas are listed discuss which ones might be easy to include in a design and which ones might not be.

Introduce the criteria for which the designs will be assessed. Invite students to add to these criteria if appropriate.

**Potential discussion prompts**

* *Does it matter how tall or wide the sculpture is?*
* *Does the sculpture need to be colourful?*
* *Will the sculpture need to be moved? How will this affect your design?*

### Prototype

Students draw a design of their sculpture. Their design should include clear labels stating the materials used and how they will be changed.

Once students have drawn a design, they should build using their materials. Encourage students to use a variety of methods to connect different materials together, including sticky tape, glue, toothpicks etc.

Optional: Students are provided opportunities to share their ideas so they might receive peer feedback.

## Communicate • Sharing our designs

### Test and share

Students share their designs with an appropriate audience, describing the materials used and how they were changed. You might do this by organising a class or community art show, by recording video of students displaying and discussing their artwork, or taking photographs of each artwork for students to annotate.

Consider how students might communicate their ideas about their sculpture/model with their audience. They might record a short video that can be watched as their sculpture/model is viewed, write a description to appear with their sculpture/model, stand alongside it and answer questions from the audience directly, or any combination of these.

### Reflect on this sequence

You might:

* refer back to the list of student questions asked in the Launch phase. Determine which questions have been answered over the course of the learning sequence, what the ‘answers’ to the questions are, and the evidence that supports these claims. Address questions that have not been answered during the learning sequence, discuss why they might not have been addressed and potential investigations that might support students to answer them.
* consider what students have learnt about how materials can be changed, the factors that might determine how easy it is to make these changes, and how, despite these changes the materials remains the same. Ask students to represent this learning in words, symbols and pictures.
* discuss why it’s important to have a good understanding of materials and how they can be changed. What kinds of jobs would require you to understand this? What about in your everyday life?